CHAPTER 2. AST Rating Procedures

2.1. Reference

2.1.1. 5 CFR, Parts 332 and 337.

2.1.2. OPM Delegated Examining Agreement.

2.2. Introduction

This chapter describes qualifications and rating requirements for NASA's single agency Aerospace Technology (AST) standard. These requirements were initially developed during the period 1959 to 1961, concurrent with a classification survey conducted by NASA to satisfy NASA's need for its own unique and discrete specializations within its mission-oriented aerospace work. NASA engaged in discussions and negotiations with OPM in arriving at the requirements described below.

2.3. Basic Education Requirement

2.3.1. Applicants must have successfully completed a standard professional curriculum in an accredited college or university leading to a bachelor's degree with major study in an appropriate field. In addition, at least 1 year of graduate study in an accredited institution, or at least 1 year of professional experience, must have been closely related to the specialty field of AST for which the applicant is being rated. See Chapter 2, Section 2.6 to determine appropriate majors for AST specialties at the GS-7 level. The term successfully completed means that the applicant must be within 9 months of completion of his/her bachelor's degree at the time of submission of the application; however, final appointment would be subject to completion of all degree requirements prior to entrance on duty.

2.3.2. An applicant who did not complete a standard professional curriculum, as described above, may nevertheless be eligible for this examination if the applicant has obtained a graduate degree or has been admitted unconditionally to full graduate status in an appropriate field in an accredited institution, provided that at least an aggregate of 1 year of the applicant's study and/or professional experience has been closely related to the specialty field for which he/she is being rated.

2.3.3. The term "appropriate field" refers to engineering (not engineering technology), physical science, mathematics, life science, computer science, or other field of science (see Chapter 2, Section 2.6). This excludes majors in the humanities or liberal arts. However, it is possible to include majors in social science or medicine or other fields if they are closely related to the duties of positions covered in Life Sciences and Systems. At the entrance levels (GS-7), there are limitations on the meaning of "appropriate field" for any given specialty as described in Chapter 2, Section 2.6. However, at higher grade levels, any of the undergraduate majors provided in the basic education requirement is acceptable for applicants who have 1 year of study or professional experience closely related to the specialty for which he/she is being rated.

2.4. Notice to Applicants

2.4.1. Applications for positions in Physical Sciences, Engineering, Mathematics, and Life Sciences will be evaluated independently by each NASA Center with delegated authority. Ratings will be assigned based on the relevancy of the applicant's training and experience for the positions at the NASA Center under its examining jurisdiction.

2.4.2. In case examining, all applicants will be notified of the results of their consideration.

2.5. Rating Schedules

2.5.1. The rating schedules for AST positions were developed by job analysis by subject matter experts in accordance with OPM instructions on test and other applicant appraisal procedures.

2.5.2. Examining in grades GS-7 through GS-15 may be conducted in the broad AST subgroups as well as in any specialty.

2.5.2.1. Determining Basic Eligibility

a. All applicants must meet the basic education requirements. For entry-level positions where applicants qualify solely on the basis of education, the major study must meet the degree/AST specialty requirements of Chapter 2, Section 2.6. For applicants who qualify for grade GS-9 or above, based on experience gained after meeting the basic education requirements, Chapter 2, Section 2.6 is desirable but not mandatory. In these cases, prime consideration should be given to the quality and level of experience.

b. Applicants must possess the necessary total length and quality of professional experience and/or education necessary to qualify for the grade level he/she will accept.

2.5.2.2. Specific Requirements by Grade Level

a. Requirements for GS-7

b. Applicants must meet the basic education requirements. The major study must be in one of the fields listed as Appropriate College Majors in Chapter 2, Section 2.6.

c. In addition to the basic education requirements, applicants must have the following: (a) 1 year of appropriate professional experience that has positively demonstrated ability or aptitude to do aerospace research, development design, operations, or closely related functions in one of the NASA technological specialties; (b) successfully completed 1full academic year of graduate study in an appropriate field in an accredited institution; or (c) any equivalent combination of experience and graduate study. Applicants not meeting (a), (b), or (c) may qualify for GS-7 if they meet any of the criteria outlined below.

d. Special Provisions for GS-7.

(1) They are in the upper third of their class, based on completed college work at the time of filing an application. This is the upper third of the class in the college or university or major subdivision (e.g., school of engineering).

(2) They have an average of 2.90 or better on a 4.0 scale for either (a) all completed college work at time of application or (b) all college courses completed during the last 2 years of the undergraduate curriculum.

(3) They have achieved a grade average of B+ (3.5 on a 4.0 scale) or better in the major field of study where such field is fully qualifying. This is either (a) the average of all completed college work in the major field of study at time of application or (b) the average of all college courses completed in the major field of study during the last 2 years of the undergraduate curriculum.

(Senior students may be rated provisionally eligible under (b) or (c) above, provided they had the required average in the junior year. They will be required to submit evidence at the time of appointment that the required average was maintained during the senior year.)

(4) They have been elected to membership in one of the national honorary scholastic societies meeting the minimum requirements of the Association of College Honor Societies (other than freshman honor societies).

(5) They have completed 12 months of student trainee experience (does not include periods of leave without pay) that includes at least one work period (2 months or 320 hours) equivalent to GS-5 or at least 15 months of appropriate student trainee experience which includes one work period equivalent to the GS-4 level.

(6) For engineering positions -- Successful completion of a 5-year program of study (e.g., one designed to be completed in no less than 5 years) or at least 160 semester hours leading to a bachelor's degree in an accredited college or university.

(7) For engineering positions -- If they have a professional engineering degree, up to 12 months of appropriate experience gained as a technician or technologist equivalent to the GS-5 level or higher may be credited as qualifying for GS-7.

Note: Criteria 1 through 7 apply only to positions in NASA. Raters should identify, on the rating sheet, the criteria on which GS-7 eligibility is based. These criteria support the provision in the National Aeronautics and Space Act of 1958, which authorizes NASA to establish entrance grades two grades higher than other agencies for certain scientific and engineering personnel.

(8) They have successfully completed all requirements for two bachelor's degrees, one in an appropriate field of science or engineering.

(9) They have 6 months aggregate of specialized experience or training, including 3 months gained after the junior year, in a subprofessional, semiprofessional, or technician status, which may have been obtained in a laboratory or elsewhere during a summer period, or assisting a professor, or on active military duty. This may have been on a part-time or intermittent basis, and may have been paid or unpaid. Must have been appropriate for NASA technological work.

(10) They have received honors or elective positions indicating superior leadership other than scholastic, provided that the applicant's academic standing was in the upper half of graduating class.

(11) They have a pattern of courses having unusual preparatory value or direct relatedness to the particular aerospace specialty for which they are being considered.

(12) They have creative research aptitude or special talent for NASA scientific or engineering work, shown by evidence obtained and documented by NASA by means of certifications from college professors or officials, standardized questionnaires, or similar techniques.

e. Requirements for GS-9. In addition to the basic education requirements --

(1) 1 year of professional experience in an appropriate field at least equivalent in difficulty and responsibility to GS-7 level work in the Federal service; or

(2) Completion of all requirements for a master's or equivalent graduate degree in an appropriate field; or

(3) Completion of 2 full academic years of graduate education in an appropriate field; or

(4) An equivalent combination of experience and graduate study as discussed in (1) and (2) above.

f. Requirements for GS-11. In addition to the basic education requirements --

(1) 1 year of professional experience in an appropriate field at least equivalent in difficulty and responsibility to GS-9 level work in the Federal service; or

(2) Completion of all requirements for a doctoral degree (Ph.D. or equivalent) in an appropriate field; or

(3) Completion of 3 full academic years of graduate education in an appropriate field; or

(4) For some research positions only, completion of all requirements for a master's or equivalent graduate degree in an appropriate field; or

(5) An equivalent combination of experience and graduate education as discussed in (1) and (3) above.

g. For GS-12 through GS-15. In addition to the basic education requirements --

(1) 1 year of professional experience in an appropriate field at least equivalent in difficulty and responsibility to that of the next lower grade in the Federal service.

(2) For some GS-12 research positions only, completion of all requirements for doctoral degree (Ph.D. or equivalent) in an appropriate field.

Note: For all grades, qualifying experience may be either paid or volunteer experience.

Time spent in military service may be credited as an extension of experience gained immediately prior to entering the service or it may be credited on its own merits, whichever is more favorable.

Positive evidence of highly creative or outstanding research, e.g., development of a basic principle, concept method, approach or technique which opened the way for major advances in the field, may result in eligibility at one grade higher than that for which the applicant would normally be rated. This principle does not apply if the applicant is eligible on the basis of graduate study.

2.5.2.3. Scoring Procedures

a. Applicants who meet the basic requirements will be rated as follows:

b. If 3 or fewer eligibles result from the screening process and they are all of the same preference status (all preference eligibles or all nonpreference eligibles), it is not necessary to rank all candidates since all are within reach under the rule of three.

c. In all instances when there are 4 or more eligibles, or when there exists a mix of preference and nonpreference eligibles, applicants must be rated based on possession of the Knowledge, Skills, and Abilities (KSA's) required to perform the duties of the position as determined by job analysis.

d. Recommended KSA's common to all AST specialties are as follows:

(1) Knowledge of engineering and/or science specialty area.

(2) Ability to identify problems, research and analyze information, and apply principles to find solutions.

(3) Ability to plan and organize work.

(4) Ability to communicate orally.

(5) Ability to communicate in writing.

e. These KSA's were developed by a NASA-wide group of Subject Matter Experts in accordance with the Uniform Guidelines on Employee Selection Procedures.

f. The rating of recommended KSA's common to all AST specialties may be supplemented or amended with different KSA's at local option. If different KSA's are used, they must be developed using job analysis and at least one Subject Matter Expert.

2.6. AST Title, NASA Classification Code

For GS-7 level positions, the undergraduate college majors in the left column will satisfy the minimum education requirement for the AST subgroups shown if the listed special provisions (footnoted) are met. In determining the appropriateness of an individual degree program to the NASA subgroups, raters must not rely on degree titles alone, since there are no standard titling practices among colleges and universities. The degree titles shown represent the degree titles normally used. Raters, however, must use judgment and discretion when either a particular degree title or a particular degree course content does not fit the norm. One degree title that needs close course content review is the bachelor's degree in computer science. A number of schools are using this title for essentially business-oriented degrees. To qualify for AST positions, the computer science curriculum must have included (or be supplemented by) 30 semester hours of course work in a combination of mathematics, statistics, and computer science that provided indepth knowledge of the following: (1) theoretical foundations and practical applications of computer science, including digital computer system architecture and system software organization, the representation and transformation of information structures, and the theoretical models for such representations and transformations; and (2) essential mathematical and statistical techniques. At least 15 of the 30 semester hours must be in any combination of statistics and mathematics that included differential and integral calculus. Candidates must also meet one of the special provisions or additional experience requirements for GS-7.

For applicants who qualify for grade GS-9 or above based on experience gained after meeting the basic education requirements, Chapter 2, Section 2.6 is desirable but not mandatory. In these cases, prime consideration should be given to the quality and level of experience.

Qualifiers for --

Space Science (701-00). If includes or is supplemented by one physics or engineering lab in electronics, optics, materials, vibration, high vacuum theory, heat transfer, or comparable field relating to aerospace instrumentation.

Earth Sciences (702-00). If includes or is supplemented by 6 semester hours or the equivalent in appropriate life or other natural science courses and includes, or is supplemented by, at least two courses that would provide knowledge of such subjects (as appropriate to the vacancy) as the following:

aerospace instrumentation	geography
optical and radar scanners	aeronomy
advanced data analysis methodology	agriculture
radiative transfer	earth resources
atmospheric physics	forestry
optics	geodynamics
atmospheric chemistry	geophysics
spectroscopy	hydrology
astronomy	land use management
in situ sensing techniques	marine resources
computer programming	mathematics
electromagnetic radiation	geodesy
computer simulation	geology
statistics	earth sciences
meteorology	biology
oceanography	numerical analysis
agronomy	forestry and agricultural
remote sensing techniques	engineering

Life Sciences and Systems (709-00) candidates must meet either of the following appropriate college majors:

a. Major study in biology (botany, zoology, biophysics, radiation biology, biochemistry, microbiology, physiology, toxicology) or in behavioral science (experimental, physiological, or clinical psychology) or other field of life science appropriate for one of these specialties, including or supplemented by at least 20 semester hours of physical science or engineering (undergraduate or graduate) or experience sufficient to provide a basis for understanding, use, and interpretation of the highly specialized ground-based or inflight measurement, environmental control, vehicle control, and other equipment required for manned or organism bearing aerospace flights and voyages; or

b. Major study in engineering or physical science appropriate for one of these specialties including, or supplemented by, at least 20 semester hours of physiology; experimental or physiological psychology; or other appropriate life science; or experience in biotechnology, human factors engineering, or other appropriate life science field.

Fluid & Flight Mechanics (710-00)

a. If includes or is supplemented by 12 semester hours (or the equivalent) of appropriate physical science or engineering courses.

b. If includes or is supplemented by 9 semester hours (or the equivalent) of physics, thermodynamics, fluid dynamics, or gas dynamics.

c. Not qualifying if major is in production, transmission, and use of large-scale industrial power.

Materials and Structures (715-00)

a. If includes or is supplemented by 12 semester hours (or the equivalent) in refractory ceramics, cermets, or protective coatings.

b. If includes or is supplemented by 12 semester hours (or the equivalent) in strength of materials, structures, thermodynamics, and/or basic static and dynamics.

c. If includes or is supplemented by 12 semester hours (or the equivalent) in physical or adaptive metallurgy, high-temperature metals and alloys, or cermets.

d. If includes or is supplemented by 9 semester hours (or the equivalent) in physics, structures, materials, or other appropriate courses.

Propulsion and Power (720-00)

a. If includes or is supplemented by one course in thermodynamics, nuclear physics, rocket propulsion fundamentals, gas dynamics, or modern or molecular physics.

b. If includes or is supplemented by 9 semester hours (or the equivalent) in physics, thermodynamics, chemistry, or closely related fields.

Flight Systems (725-00)

a. If includes or is supplemented by 9 semester hours (or the equivalent) in machine design, mechanics, hydraulics, dynamics, thermodynamics, mechanical design, or mechanical measurement.

b. Reliability and Quality Assurance (725-04), Reliability (725-05), and Quality Assurance (725-22). If it is supplemented by 18 semester hours in any combination of the following courses, provided that at least 15 semester hours are from column 1:

Column 1	Column 2
dynamics	chemistry
statics	ergonomics
thermodynamics	management

materials
electronics
signal Processing
mechanics
fluids
manufacturing engineering
statistics
systems safety
reliability
operations research
quality assurance
systems engineering
economics
facilities planning
computer science

Measurement and Instrumentation System (730-00)

a. If includes or is supplemented by two courses in solid state physics, materials, optics, statics and dynamics, electricity and electronics, electron optics, kinetic theory of gases, electromagnetic propagation or radiation, semiconductors, vibration, information theory, or heat transfer.

b. Except for major in production, transmission, and use of large-scale industrial electrical power.

Data Systems (735-00)

a. If includes or is supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses (not required for data analysis, modeling, or computer research and development positions).

b. If includes or is supplemented by 6 semester hours (or the equivalent) in mathematics beyond basic calculus (i.e., any mathematics course in which basic calculus is listed as a prerequisite).

c. If includes or is supplemented by at least two of the following courses:

Data Analysis, Modeling, and Computer Research and Development

numerical methods (or numerical analysis)
linear algebra
theory of equations
differential equations
mathematical statistics (if 6 semester hour course)
operating systems
theory of computation

computer networks
programming languages (e.g., Fortran, COBOL)
data structures
data base management
computer graphics
compiler construction
computer architecture
software engineering

Hardware Systems, Software Systems, Data Systems, Data Systems Analysis, and Theoretical Simulation Techniques

electronics
electrical networks
solid state physics (for transistors, tapes)
optics (for simulation)
electricity and magnetism
computer organization
logic design
control systems
communication theory

Facilities (740-00). If includes or is supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses.

Operations (745-00). If includes or is supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses.

Note: For Research Piloting (745-10) positions GS-9 through GS-15, appropriate college majors include any of the majors listed in Appendix A or under Life Sciences and Systems, Appendix B. In addition to the basic education requirements, candidates must have a current Federal Aviation Administration commercial pilot's license with instrument rating or a pilot and instrument rating from the armed services. One, or a combination of, the following criteria must also be met:

For GS-9 --

1. A minimum of 900 hours of pilot-in-command (or first pilot) flight time that included at least 500 hours in jet aircraft having at least 3,000 pounds of thrust per engine; or

2. 1 year of research piloting experience.

For GS-11 --

1. A minimum of 1,000 hours of pilot-in-command (or first pilot) flight time that included at least 500 hours in jet aircraft having at least 3,000 pounds of thrust per engine; or

2. 1 year of research piloting experience of which 1 year must have been equivalent to grade GS-9.

For GS-12/15:

1. A minimum of 1,500 hours of pilot-in-command (or first pilot) flight time that included at least 500 hours in jet aircraft having at least 3,000 pounds of thrust per engine; plus 1 year of research piloting experience equivalent to the next lower grade in the Federal service; or 1 year of research piloting experience equivalent to the next lower grade.

2. For positions whose principal duties involve research and development of experimental rotorcraft, pilot-in-command (or first pilot) flight time in aircraft powered by engines having a total of 1,000 horsepower or more in lieu of flight time in jet aircraft may be substituted at all grades.

Management (770-00)

a. If major includes or is supplemented by 12 semester hours (or the equivalent) in appropriate physical science or engineering courses; or

b. If major includes or is supplemented by mathematics through, and including, the integral calculus level.

Note: In filling positions in the AST, Life Science Program Management specialty, the qualifications requirements are those shown under NASA Class Code (NCC) 709, Life Sciences.

2.7. Documentation

The purpose of the documentation is to allow someone not familiar with the selection process to evaluate the job-relatedness of that process. To this end, the documentation should provide a brief, clear narrative description of the job analysis, the recruitment procedures, and the screening and ranking process. To the extent feasible, copies of all data should be retained.

1. With respect to the job analysis, the documentation should include the following:

   a. The title, grade, and location of the vacancy.

   b. The date and location of the job analysis.

c. The names and titles of all participants and their relationship to the vacancy.

d. A list of the major duties of the position (or copy of the position description).

e. A list of the KSA's associated with the job.

f. A list of selective factors that were identified, if any.

2. The relationship between the KSA's and the duties should be clear. With respect to the recruiting activities, the documentation should include the following:

a. A copy of the announcement and copies of any other advertisements.

b. A copy of any other advertisements and/or distribution activities.

3. With respect to screening and ranking activities, the documentation should include the following:

a. A log of all applications that contains information for each applicant about that applicant's eligibility.

b. The names and titles of Subject Matter Experts participating.

c. A copy of the rating plan to include descriptions of KSA’s at each rating level.

d. Signature of personnel specialist (all panel members, if a panel is used).

2.6: AST TITLE, NASA CLASSIFICATION CODE

ACADEMIC MAJOR	SPACE SCI. 701-XX	EARTH SCI. 702-XX	FLUID & FLIGHT MECH. 710-XX	MATERIALS & STRUCT. 715-XX	PROPULSION & POWER 720-XX	FLIGHT SYSTEMS 725-XX	MEASUREMENT & INST. SYS. 730-XX	DATA SYSTEMS 735-XX	FACILITIES 740-XX	MGT 770-XX	OPNS 745-XX
AERONAUTICAL ENG.		Xa	X	X	X	X	X	Xbc	X	X	X
AERONAUTICS		Xa	X	X	X	X	X	Xbc	X	X	X
AEROSPACE ENG.	X	Xa	X	X	X	X	X	Xbc	X	X	X
ARCHITECTURE									X		
ASTRONAUTICAL ENG.	X	Xa	X	X	Xb	X	X	Xbc	X	X	X
ASTRONAUTICS	X	Xa	X	X	X	X	X	Xbc	Xa	X	Xa
ASTRONOMY	Xa	Xa	Xa				Xa	Xbc		Xab	
ASTROPHYSICS	Xa	Xa	X				X	Xbc		X	
BIOMEDICAL ENG.		Xa				X	Xa	Xbc	Xa	X	Xa
CERAMIC ENG.		Xa		Xa		Xa		Xbc	X	X	X
CERAMICS		Xa		Xa		Xa		Xbc	X	X	X
CHEMICAL ENG.		Xa	Xb	X	Xb	Xa	X	Xbc	X	X	X
CHEMISTRY		Xa		X	X	Xa	Xa	Xbc		X	
CIVIL ENG.		Xa		Xb				Xbc	X	X	X
COMPUTER SCIENCE		Xa	Xa	Xb		Xa	Xa	Xac	Xa	Xab	Xa
COMPUTER ENG.		Xa	Xa	Xb		Xa	Xa	X	Xa	Xab	Xa
EARTH & PLANETARY SCI.	X	Xa						Xbc		Xab	
ELECTRICAL ENG.	X	Xa	Xc		Xa	Xa	Xb	Xbc	X	X	X
ELECTRONIC ENG.	X	Xa	X		Xa	Xa	X	Xbc	X	X	X
GEOLOGY	Xa	Xa		Xb				Xbc	Xa	Xab	Xa
GEOPHYSICS	Xa	Xa						Xbc			
INDUSTRIAL ENG.						Xb		Xbc	X	X	X
MATERIALS ENG.		Xa		X		X		Xbc	X	X	X

For the descriptions of footnotes a, b, c, and d, see specific qualification requirements per specialty following these charts in Chapter 2, Section 2.6.

2.6: AST TITLE, NASA CLASSIFICATION CODE (Continued)

ACADEMIC MAJOR	SPACE SCI. 701-XX	EARTH SCI. 702-XX	FLUID & FLIGHT MECH. 710-XX	MATERIALS & STRUCT. 715-XX	PROPULSION & POWER 720-XX	FLIGHT SYSTEMS 725-XX	MEASUREMENT & INST. SYS. 730-XX	DATA SYSTEMS 735-XX	FACILITIES 740-XX	MGT 770-XX	OPNS 745-XX
MATERIALS SCI.		Xa		X		X		Xbc	Xa	Xb	Xa
MATH., APPLIED	Xa	Xa	Xb	Xd	Xa	Xa	Xa	Xc	Xa	Xa	Xa
MATH., PURE	Xa	Xa	Xa	Xd	Xb	Xa	Xa	Xac	Xa	Xa	Xa
MECHANICS, APPLIED		Xa	X	X	X	X	X	Xbc	X	X	X
MECHANICS, ENG.		Xa	X	X	X	X	X	Xbc	X	X	X
MECHANICAL ENG.		Xa	X	X	X	X	X	Xbc	X	X	X
METALLURGICAL ENG.		Xa		Xc		X		Xbc	X	Xb	X
METALLURGY		Xa		Xc		X		Xbc	Xa	Xb	Xa
METEOROLOGY	Xa	Xa						Xbc		X	
NUCLEAR ENG.											
NUCLEAR ENG. PHYSICS		Xa	X		X	X	X	Xbc	X	X	X
OCEANOGRAPHY	Xa	Xa	X	Xd	X	X	X	Xbc	X	X	X
		Xa		X			Xa	Xbc		Xab	
OPTICAL ENG.	X	Xa					X	Xbc	X	X	X
PHYSICS	Xa	Xa	X	X	X	X	X	Xbc	Xa	X	Xa
PHYSICS, APPLIED	Xa	Xa	X	X	X	X	X	Xbc	Xa	X	Xa
PHYSICS, ENG.	X	Xa	X	X	X	X	X	Xbc	Xa	X	Xa
SPACE SCIENCE	X	Xa						Xbc		Xab	
STRUCTURAL ENG.		Xa		X		X		Xbc	X	X	X
WELDING ENG.				X		X		Xbc	X	Xb	X
(OR) OTHER APPROPRIATE PHYSICAL SCIENCE OR ENGINEERING FIELD	Xa	Xa	Xa, b, or c	Xa, b, c, or d	Xa or b	Xa	Xab	Xbc	Xa	Xab	Xa

For the descriptions of footnotes a, b, c, and d, see specific qualification requirements per specialty following these charts in Chapter 2, Section 2.6.